



SBIR/STTR SUCCESS



MADE IN SPACE, INC.

While the average consumer is still coming to grips with the mere concept of 3D printing, Made In Space is already miles beyond this seemingly new trend. 220 miles beyond Earth's atmosphere to be exact – where astronauts and NASA personnel at the International Space Station (ISS) are printing tools and other necessities in zero gravity that will open up an entirely new era of off-world additive manufacturing.

PHASE III SUCCESS

\$1,493,506 – Phase 1 on-orbit operations complete. Hardware delivered and performed nominally on ISS. Testing specimens returned to Earth and awaiting analysis.

AGENCIES

NASA

SNAPSHOT

The first company to successfully manufacture in space, Made In Space is partnering with NASA to bring 3-D printing and plastics reuse and recycling to the International Space Station. Started with 2 employees. Up to 24 currently.

MADE IN SPACE, INC.

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Made In Space's Zero-G Printer was launched to the ISS on September 21st, 2014, under a partnership agreement with NASA Marshall Space Flight Center. This accelerated path to success for the California-based company founded in 2010 can be somewhat attributed to its young and naively ambitious staff whose futuristic visions can't help but spread excitement and awe. But it can also be attributed to NASA's Small Business Innovation Research (SBIR) program. With a Phase I and subsequent Phase II award to build an Additive Manufacturing Facility (AMF) for on-demand fabrication in space, Made In Space successfully deployed its innovation and became the first company to manufacture in zero gravity.

"We asked ourselves, what is the fastest, cheapest way to bring manufacturing to space?" explains Made In Space Chief Engineer Mike Snyder. "We spent weeks testing hardware and commercial printers, and flight testing and learning how to make a printer gravity independent. We soon discovered that it was easier and more efficient to build from the ground up."

The realization that they had to construct hardware that can build what is needed in space, as opposed to launching it from Earth, helped the company accelerate its own technology and broaden space development while simultaneously opening up the opportunity for people on Earth to use in-space capabilities. Made In Space's Additive Manufacturing Facility, which utilized these lessons learned, will demo on the ISS this year as part of a recent Phase III contract with NASA as well as be made available to a variety of commercial entities for a broad range of potential applications. And although reaching a Phase III milestone is a huge success even for longstanding companies, Made In Space is not about to stop there.



LEFT: Made In Space's 3D printer being installed on the International Space Station. *Photo courtesy of NASA.*

RIGHT: Aaron Kemmer of Made In Space stares through the windows of the Microgravity Science Glovebox with the Zero-G 3D Printer enclosed.

To understand the direction of the company, one must first grasp the vision of its creators.

"Our overall goal as a company is to help humanity colonize space," adds Snyder. "This is how biology works – we spread like a rapid virus to everywhere we can live. Space is no different. Whether it's the moon, Mars, other moons and solar systems, or free floating on an asteroid, that is the goal of our species."

To this end, the company's innovations all have the common, interwoven theme of utility and practicality in other worlds.

"Obviously you need manufacturing for this to happen, so we tackled that first, as an entry point," says Snyder. "This is the cornerstone of our future work – the things that help colonization. Our first closed loop building system will be the material reclaimer we are working on, so that the material from a 3D printed object can be reused once the original objects breaks or becomes obsolete."

Named the R3DO, this plastic recycling system for creating 3D printer feedstock on-orbit also began as a NASA SBIR project. Made In Space has since flown a prototype on several microgravity flights to verify that it is capable of recycling ABS plastic and extruding feedstock in microgravity. The extruded feedstock was then used to successfully print parts using Made In Space 3D printers. The company hopes to support ISS activities with this technology, as well as several other in-space missions that will significantly enable and improve NASA's exploration efforts.

Across the federal agencies, Made In Space hopes to partner with the US Navy regarding the integration of the R3DO system into Naval operations and logistics. As for commercial potential, the development of a high quality, reliable, and safe recycler will be highly useful to the commercial 3D printing market, which continues to grow exponentially.

Up to 24 employees (from 2), Made In Space is also enjoying internal growth. With new office space next to its Google neighbors in Mountain View, California, they are comfortable in calling this high-tech area their permanent home. Snyder is appreciative of the support and confidence they received from NASA and attributes the success to the initial kickoff funding provided by the SBIR program.

"We really went from bootstrapping and relying on internal investments, to somebody having faith in us," adds Snyder. "The SBIR program believed in us and thought we could pull this off – and we haven't let them down yet."